City of Lexington
Urban Tree Canopy Study, Goal Setting and Implementation Plan

Background:

Lexington, located in the Great Valley of Virginia, was founded in 1778. Close to 7200 people live within the 2.5 square-mile city. Located in an area of great natural beauty and numerous historical attractions, Lexington is also a city whose citizens value trees. Many areas of the city are well forested, and the City Council enacted a Tree Ordinance in 2000 which created a Tree Board and a part-time arborist position to care for public trees. Lexington has been a Tree City USA since 2000.

Trees provide many benefits to the community, but a beneficial function sometimes overlooked is the role of trees in improving water quality. As they slow and filter storm water runoff from impervious surfaces like roads and parking lots, trees and the soil around them "catch" pollutants before they reach nearby bodies of water. The Chesapeake Bay Program has recognized the role that trees play in improving water quality. The Virginia Department of Forestry provided a Water Quality Improvement grant to Lexington in 2007 to measure the City's urban tree canopy and challenged Lexington to increase its canopy coverage to further improve water quality of its own streams and rivers, and of the Chesapeake Bay. This report describes the canopy study and lists goals and policies to both preserve and increase Lexington's green canopy.

Urban Tree Canopy:

The urban tree canopy (UTC) is the layer of leaves, branches and stems of trees that cover the ground when viewed from above.

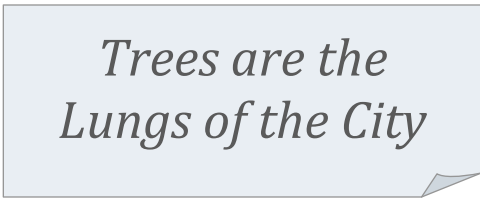### Why is the Urban Tree Canopy Important?

UTC can provide many benefits. It mitigates temperatures, filters the air and water, provides wildlife habitat, reduces energy use, sequesters carbon, increases property values and beautifies the community.

The Urban Tree Canopy Study and its Results

High-resolution aerial images of the area were made in 2008. These images were able to capture single trees (those with a canopy at least 12 feet wide) with 90% accuracy. The images were analyzed by Virginia Tech's Geospatial Extension Program in conjunction with parcel data provided by the City. The analysis found that more than 649 acres of the city is currently covered by tree canopy, corresponding to 44% of all land. This percentage compares favorably with other cities nearby: Charlottesville: 47%; Winchester: 27%; Leesburg 27%; Fairfax County 41%; and Lynchburg: 58%. Most of Lexington's urban tree canopy is on private property in residentially-zoned areas.

Lexington, Virginia Urban Tree Canopy Study Implementation Plan
September 2009

Tree Trends in Lexington

The Canopy Study provides a snapshot of current tree cover. What changes in this picture can we expect over the next 20 years? We can anticipate an <u>increase</u> in UTC in the areas of new development where the City has recently planted trees. Many of these trees are still small enough that they were probably not even captured with the Canopy Study imagery. This includes areas like the new Firehouse, parking lots at the old Firehouse and Police Station, Fairwinds Park and the South Main Street rain gardens. On the other hand, Lexington's older neighborhoods face a large tree loss over the next 30 years as trees mature and will have to be removed. With limited space for new development in the downtown commercial district, expected infill will remove or restrict space for trees to grow. Another area where UTC will most likely decrease is on the three large tracts of undeveloped, still forested area in the City limits. These areas include parts of the campuses of Washington and Lee University and Virginia Military Institute, and private property along the East bluffs of Lexington, including the Donald tract. Washington and Lee University's Master Plan shows dormitories and additional playing fields planned for the north side of their campus. VMI will be developing its North Post along Woods Creek, also adding playing fields and various facilities that will certainly mean tree loss.

> *Trees are the Lungs of the City*

These are all expected changes. What must also be considered are the unknowns of disease or insect outbreaks, and weather calamities like wind storms and ice storms any of which can change a city's tree cover in a few days or a few short years. These unanticipated changes are not factored into this goal-setting. Their occurrence will mean that goals will need to be increased.

Goal Setting:

What is the ideal canopy cover for a city? Given the many benefits of trees, a general rule is the more the better. In 2002, American Forests (www.americanforests.org) set canopy cover targets by land use, recommending 15% canopy cover in downtown areas, 25 % in urban residential zones, and 50% in suburban residential zones.

To develop this Implementation Plan, Lexington has gathered input from the Lexington Tree Board and City staff including the City Manager, the Director of Planning and Development, and the City Arborist. This Plan will become part of a larger City Tree Management Plan that will be approved by City Council, the Tree Board and the Planning Commission.

Lexington has set a goal to increase its UTC to 47% Citywide over the next 30 years. This goal would increase the canopy by 3% over its current 44%. With trees being relatively slow-growing in nature, the objective is to plant 100% of the trees needed to reach the overall UTC goal in the next 10 years. Assuming the canopy of a mature tree is 30 feet in diameter, this increase means planting over 2700 trees in the next 10 years, or about one tree for every 3 citizens. Another way of looking at this number is that 5 trees will be planted every week for the next 10 years.

- Lexington will plan to maintain the existing 44% of canopy.
- An additional 44 new acres of UTC will be added over the next 10 years.
- Using the rate of 62 trees = 1 acre of canopy, Lexington will need to plant over 2700 trees in the next 10 years.

Tree planting is not enough, however. Given that much of Lexington's tree canopy is mature, attaining a canopy cover of 47% will only be possible through a combination of tree planting, maintenance and protection.

Tree Planting

Residential Areas

Trees in residential areas provide welcome shade and privacy, encourage walking, and contribute greatly to the character of a neighborhood. The City's subdivision ordinance requires that new neighborhoods have street trees planted. In the Penrith development (picture right) located between Lewis and Morningside streets, for example, trees planted eight years ago by the developer are still small but over time will shade streets and sidewalks.

Opportunities for <u>public</u> tree planting are limited in most Lexington neighborhoods because City rights-of- way are narrow or non-existent. These narrow streets are part of the City's charm, and will not easily be changed without drastic modifications of front yards. For the most part, new trees will be planted on private property. In older Lexington neighborhoods like Providence Hill and west Lexington,

much of the existing tree canopy is mature. Many of these trees were planted on spacious lots at about the time the houses were built from 40 to 90 years ago. In the next 30 years, the look of these neighborhoods will change dramatically as older trees will have to be removed because of advancing age.

Many communities in the United States are seeing a trend to expanding house footprints, where existing houses are torn down and replaced with much larger ones. This tendency, coupled with infill when lots are divided, has the potential to markedly limit space for trees to grow. Yet the greatest benefits from trees come from those that are both larger growing (an oak as opposed to a dogwood, for example) and longer-lived. Where will the space be found for these larger trees?

The City should take a proactive role now by planting younger trees throughout these older neighborhoods, by encouraging residents to replace trees that are removed with large-statured shade trees, and by planting a greater diversity of tree types. The City should encourage planting of additional trees on private property by initiating a program that will provide low-cost trees to property owners. This program can be in conjunction with Arbor Day, and a fall Arbor Day can be celebrated to encourage planting at a time when trees are easier to establish.

As infill and house replacement occurs, the City should examine its zoning rules to make sure they allow for adequate green space around residential dwellings. One zoning tool already used for this purpose is the Planned Unit Development (PUD). A PUD is intended to provide both for development flexibility of undersized parcels and to allow the use of diversified development techniques for larger parcels. If an individual or a developer requests higher residential density than standard zoning allows, the City can require that a percentage of the development be dedicated to green space, or that important natural features like trees be preserved.

Goal: The City should establish a program to encourage the planting of trees on private property in Lexington neighborhoods that are anticipating mature tree loss.

Goal: The City should use zoning to encourage the preservation of green spaces in residential areas.

Commercial Areas

The value of trees in commercial areas is well documented, with a University of Washington study finding that shoppers lingered longer and spent more money in landscaped and treed shopping areas. Most people prefer to park in a shaded spot, and research has revealed the contributions which trees in parking areas make to both reducing emissions and extending the life of paving. In commercial areas where impermeable surfaces abound, the role of trees in capturing and reducing storm water runoff is especially significant.
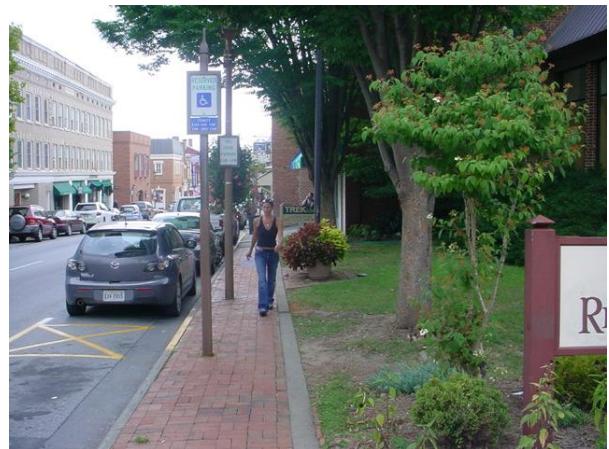
However tree-planting locations are limited in Lexington's downtown business district because of small building setbacks. Many of the trees in this area are found on private property where buildings adjoin or enclose a small green space. Examples include the old Courthouse Square, the Chess Park, and trees in front of the Lexington Presbyterian Church, and the library on Main Street (pictured above). The cultivation and preservation of these pocket parks is vital to fostering tree canopy in the downtown area.

The City has the ability to require the planting of trees through its site review process of new or existing development. This will be an important tool in coming years as infill replaces parking lots or even existing green spaces. Developers should be strongly encouraged to provide room for larger-growing trees and welcoming space beneath them for benches and landscaping. These shady seating areas are an indispensible component of pleasant cities.

Parking lots also offer tree-planting possibilities not only in the downtown area, but wherever commercial property is located. For the longest-lived trees, however, there must be adequate root space. Healthy trees and sufficient parking can co-exist. Pavement modifications to help trees thrive include soil cells, root trenches, and permeable pavement. Where roots have room to grow, they are less likely to damage the infrastructure around them.

> **Benefits of Shaded Parking Lots**
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> Trees provide important benefits in parking lots. They moderate the heat absorbed by asphalt. Cooler air temperatures reduce ozone concentrations by lowering hydrocarbon emissions. The cooler the car, the lower the rate of evaporation from gas tanks, hoses, and vehicle fabrics.
> Trees in Davis, CA parking lots reduce surface asphalt temperatures by as much as 36 degrees F, vehicle cabin temperatures by over 47 degrees F, and fuel tank temperatures by nearly 7 degrees F.
> *Scott, K.I.; Simpson, J.R.; McPherson, E.G. 1999. **Effects of tree cover on parking lot microclimate and vehicle emissions**. J. Arbor. 25: 129–141.*

Lexington has sponsored a number of parking studies over the last 10 years to determine the need for adding additional parking. In that time, parking decks have been built at both Washington and Lee University and at the new Courthouse. In fall of 2009, the city will undertake a parking study to examine current parking patterns. Hopefully, the results of this study will serve as an impetus to convert some parking areas to trees or to green space.

Additional commercial areas that could be developed or redeveloped in the City limits include the VDOT yard on Waddell Street, property along South Main, and property along East Nelson Street. The 2006 Land Use chapter of the Comprehensive Plan recommends the creation of design manuals for these areas to encourage pedestrian-friendly, appropriate development. These manuals provide the City an opportunity to emphasize the importance of trees to make commercial areas more attractive, viable and pedestrian-friendly.

Goal: The city should consider converting paved areas to vegetated areas in the commercial districts.

Goal: The City should continue to foster design that incorporates trees in new commercial development.

Parks and Natural Areas

City parks and natural areas like the Woods Creek Trail provide additional tree-planting opportunities. A balance of treed areas and open space is important for recreation, and this balance varies among the various parks depending on their use. Parks like Woods Creek and Richardson Park were originally "designated" as parks with grass being planted around the existing trees. Therefore, Woods Creek Park's mature trees are mostly sycamores, and Richardson Park contains a preponderance of black locust and Siberian elms. New plantings in these and other parks should aim to increase diversity and to replace high-maintenance trees like Siberian elms with species needing less maintenance.

Since 2003, a series of public tree plantings along Woods Creek has helped to establish a riparian buffer. While the area from the bridge over Sara's Run to Lime Kiln Bridge Road is now well established with trees, other opportunities for adding trees exist, including privately owned land along the creek and other areas further downstream. The Woods Creek Trail roughly follows the creek which traverses property owned by both Washington and Lee University and Virginia Military Institute. Washington and Lee University has cooperated with the City on a number of water quality improvement projects. With the development of VMI's North Post, additional opportunities will emerge for projects to protect water quality through tree planting and preservation.

Goal: Park tree plantings should aim to increase diversity and add shade where appropriate.

Goal: The city should continue to work with institutional partners like the colleges to improve water quality by additional tree planting.

Tree Maintenance

Who takes care of Lexington's trees? Care falls to tree owners, so a look at tree "owners" in the city is enlightening: The majority of trees in the City are on private property, chiefly in residential areas. Many of Lexington's roadside trees are also privately owned because of narrow rights-of-way. Institutional lands include the campuses of VMI and Washington and Lee, the hospital, 2-County owned schools and comprise at least 20% of City acreage. A significant percentage of Lexington's trees are cared for by these institutional partners. Less than 10% of the total acreage in Lexington is City-managed parks, cemeteries and public buildings and parking lots.

Education is vital to promoting beneficial tree maintenance. While most tree care in Lexington is done by firms doing quality work, practices harmful to trees, like topping, are still evident. In addition, trees are often harmed by construction practices and may take years to show the damage. A third maintenance practice amenable to education is the importance of pruning young trees to make them less vulnerable to damage from ice storms and wind when they are mature. Lastly, in many older neighborhoods where large, mature trees grow, education about care of these older "residents" can prolong tree's lives.

Goal: The City should continue to educate residents and property owners about proper tree maintenance.

Tree Protection

The City has a number of methods to protect its trees, including a Tree Ordinance enacted in 2000 and revised in 2006. City crews excavating roots under tree canopies consult the City Arborist. Tree protection is required for public trees located near construction. Repairs to sewers and sidewalks can be done in ways that are less damaging, for example by bridging raised sidewalks instead of cutting roots, or relining sewer pipes instead of laying new ones, or using root barriers to prevent root intrusion into vulnerable pipe joints.

When development is on private property, a site plan review process allows the Arborist and Erosion and Sedimentation Officer to specify tree protection measures. This oversight will be especially important as development proceeds in the City's still forested areas like East Lexington.

Goal: Continue to encourage tree protection measures for public and private trees during development and infrastructure repair.

References

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Midwest community tree guide: benefits, costs, and strategic planting. McPherson, E. Gregory; Simpson, James R.; Peper, Paula J.; Maco, Scott E.; Gardner, Shelley L.; Cozad, Shauna K.; Xiao, Qingfu. 2006. Gen. Tech. Rep. PSW-GTR-199. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 99 p.
This report quantifies benefits and costs for typical small, medium, and large deciduous (losing their leaves every autumn) trees: crabapple, red oak, and hackberry. The analysis assumed that trees were planted in a residential yard or public site (streetside or park) with a 60-percent survival rate over a 40-year timeframe. Tree care costs were based on results from a survey of municipal and commercial arborists. Benefits were calculated by using tree growth curves and numerical models that consider regional climate, building characteristics, air-pollutant concentrations, and prices. **(This publication includes Lexington, Virginia in its reference area.)**
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